

JOURNAL OF BACTERIOLOGY

2011 INSTRUCTIONS TO AUTHORS*

SCOPE

The *Journal of Bacteriology* (JB) publishes descriptions of basic research on bacteria and other microorganisms. Topics that are considered include structure and function, biochemistry, enzymology, metabolism and its regulation, molecular biology, genetics, plasmids and transposons, general microbiology, plant microbiology, chemical or physical characterization of microbial structures or products, and basic biological properties of organisms.

ASM publishes a number of different journals covering various aspects of microbiology. Each journal has a prescribed scope that must be considered in determining the most appropriate journal for each manuscript. The following guidelines should be of assistance.

(i) JB will consider papers that describe the use of antibiotics and antimicrobial agents as tools for elucidating the basic biological processes of microorganisms. However, papers dealing with antimicrobial agents, including manuscripts dealing with the susceptibility to, resistance to, biosynthesis of, and metabolism of such agents, are more appropriate for *Antimicrobial Agents and Chemotherapy*.

(ii) JB will consider manuscripts that emphasize the interrelationship of a bacteriophage and a host cell, manuscripts about work in which viruses were used as tools for elucidating the structures or biological processes of microorganisms, and manuscripts that concern phages that are related to transposable elements or plasmids.

(iii) Manuscripts describing new or novel methods or improvements in media and culture conditions will not be considered by JB unless they are applied to the study of basic problems in microbiology. Such manuscripts are more appropriate for *Applied and Environmental Microbiology* or for the *Journal of Clinical Microbiology*.

(iv) Manuscripts dealing with ecology or environmental studies or with the application of microorganisms to agricultural or industrial processes are more appropriate for *Applied and Environmental Microbiology*.

(v) Manuscripts dealing with the immune system or with topics of medical interest are more appropriate for *Infection and Immunity*.

(vi) In most cases, reports that emphasize methods and nucleotide sequence data alone (without experimental documentation of the functional and evolutionary significance of the sequence) will not be considered by JB.

(vii) Manuscripts describing work, with a new organism, that largely repeats published research done with a different organism will be considered if they significantly

increase the understanding of the original property, if they provide an extensive basis for evolutionary comparison, or if the work is of unusual importance because of its relationship to other properties of the new organism. Manuscripts that describe genes or enzymes, for example, that differ only in minor ways from the prototypes are not suitable for JB.

(viii) The criteria described in section vii above also apply to genome maps. Manuscripts describing a genome map should provide an extensive basis for evolutionary comparisons or significantly increase our fundamental understanding of the organism or system.

Questions about these guidelines may be directed to the editor in chief of the journal being considered.

If transfer to another ASM journal is recommended by an editor, the corresponding author will be contacted.

Note that a manuscript rejected by one ASM journal on scientific grounds or on the basis of its general suitability for publication is considered rejected by all other ASM journals.

EDITORIAL POLICY

Use of Microbiological Information

The Council Policy Committee (CPC) of the American Society for Microbiology affirms the long-standing position of the Society that microbiologists will work for the proper and beneficent application of science and will call to the attention of the public or the appropriate authorities misuses of microbiology or of information derived from microbiology. ASM members are obligated to discourage any use of microbiology contrary to the welfare of humankind, including the use of microbes as biological weapons. Bioterrorism violates the fundamental principles expressed in the Code of Ethics of the Society and is abhorrent to ASM and its members.

ASM recognizes that there are valid concerns regarding the publication of information in scientific journals that could be put to inappropriate use as described in the CPC resolution mentioned above. Members of the ASM Publications Board will evaluate the rare manuscript that might raise such issues during the review process. However, as indicated elsewhere in these Instructions, research articles must contain sufficient detail, and material/information must be made available, to permit the work to be repeated by others. Supply of materials should be in accordance with laws and regulations governing the shipment, transfer, possession, and use of biological materials and must be for legitimate, bona fide research needs. Links to, and information regarding, these laws and regulations can be found at <http://www.asm.org/> under the Public Policy tab. We ask that authors pay particular attention to the NSAR Select Agent/Toxin list on the CDC

*Instructions to Authors are published annually in the January issue. A separate html version, which is updated throughout the year, is at <http://jb.asm.org/misc/ifora.dtl>.

website <http://www.selectagents.gov/index.html> and the NSABB criteria for identifying dual use research of concern in the report “Proposed Framework for the Oversight of Dual Use Life Sciences Research: Strategies for Minimizing the Potential Misuse of Research Information” on the Office of Biotechnology Activities website http://oba.od.nih.gov/biosecurity/pdf/Framework%20for%20transmittal%200807_Sept07.pdf (p. 17–22).

Ethical Guidelines

ASM requirements for submitted manuscripts are consistent with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals, as last updated by the International Committee of Medical Journal Editors in April 2010 (<http://www.icmje.org>).

Authors are expected to adhere to the highest ethical standards. The following sections of these Instructions include detailed information about ASM’s ethical standards. Failure to comply with the policies described in these Instructions may result in a letter of reprimand, a suspension of publishing privileges in ASM journals, and/or notification of the authors’ institutions. Authors employed by companies whose policies do not permit them to comply with ASM policies may be sanctioned as individuals and/or ASM may refuse to consider manuscripts having authors from such companies. The ASM Publications Board wishes to clarify the following in particular.

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Primary publication. Manuscripts submitted to the journal must represent reports of original research, and the original data must be available for review by the editor if necessary.

By submission of a manuscript to the journal, the authors guarantee that they have the authority to publish the work and that the manuscript, or one with substantially the same content, was not published previously, is not being considered or published elsewhere, and was not rejected on scientific grounds by another ASM journal. It is incumbent upon the author to acknowledge any prior publication, including his/her own articles, of the data contained in a manuscript submitted to an ASM journal. A copy of the relevant work should be submitted with the paper as supplemental material. Whether the material constitutes the substance of a paper and therefore renders the manuscript unacceptable for publication is an editorial decision.

In brief, a paper is not acceptable for submission to an ASM journal if it, or its substance, has been published/posted in:

- A serial, periodical, or book
- A conference report or symposium proceedings
- A technical bulletin or company white paper
- A nonpersonal website
- Any other retrievable source

The following do not preclude submission to, or publication by, an ASM journal, as long as the posted data do not constitute the substance of a submission:

- Posting of a method/protocol on a nonpersonal website
- Posting of a limited amount of original data on a personal/university/corporate website or websites of small collaborative groups working on a problem
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An author is one who made a substantial contribution to the overall design and execution of the experiments; therefore, **ASM considers all authors responsible for the entire paper.** Individuals who provided assistance, e.g., supplied strains or reagents or critiqued the paper, need not be listed as authors but may be recognized in the Acknowledgments section.

A study group, surveillance team, working group, consortium, or the like (e.g., the Active Bacterial Core Surveillance Team) may be listed as a coauthor in the byline if its contributing members satisfy the requirements for authorship and accountability as described in these Instructions. The names (and institutional affiliations if desired) of the contributing members only may be given in a footnote linked to the study group name in the byline or as a separate paragraph in the Acknowledgments section.

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The use of human subjects or other animals for research purposes is regulated by the federal government and individual institutions. Manuscripts containing information related to human or animal use should clearly state that the research has complied with all relevant federal guidelines and institutional policies. Copies of these guidelines and policy statements must be available for review by the editor if necessary.

Patient Identification

When isolates are derived from patients in clinical studies, do not identify them by using the patients' initials, even as part of a strain designation. Change the initials to numerals or use randomly chosen letters. Do not give hospital unit numbers; if a designation is needed,

use only the last two digits of the unit. (Note: established designations of some viruses and cell lines, although they consist of initials, are acceptable [e.g., JC virus, BK virus, and HeLa cells].)

Nucleotide and Amino Acid Sequences

Newly determined nucleotide and/or amino acid sequence data must be deposited and GenBank/EMBL/DDBJ accession numbers must be included in the manuscript no later than the modification stage of the review process. It is expected that the sequence data will be released to the public no later than the publication (online posting) date of the accepted manuscript. The accession numbers should be included in a separate paragraph at the end of the Materials and Methods section. If conclusions in a manuscript are based on the analysis of sequences and a GenBank/EMBL/DDBJ accession number is not provided at the time of the review, authors should provide the sequence data as supplemental material.

It is expected that, when previously published sequence accession numbers are cited in a manuscript, the original citations (e.g., journal articles) will be included in the References section when possible or reasonable.

Authors are also expected to do elementary searches and comparisons of nucleotide and amino acid sequences against the sequences in standard databases (e.g., GenBank) immediately before manuscripts are submitted and again at the proof stage.

Analyses should specify the database, and the date of each analysis should be indicated as, e.g., January 2011. If relevant, the version of the software used should be specified.

See “[Presentation of Nucleic Acid Sequences](#)” for nucleic acid sequence formatting instructions.

The URLs of the databases mentioned above are as follows: DNA Data Bank of Japan (DDBJ), <http://www.ddbj.nig.ac.jp/>; EMBL Nucleotide Sequence Database, <http://www.ebi.ac.uk/embl/>; and GenBank, National Center for Biotechnology Information, <http://www.ncbi.nlm.nih.gov/>.

Proper Use of Locus Tags as Systematic Identifiers for Genes

To comply with recommendations from the International Nucleotide Sequence Database (INSD) Collaborators and to avoid conflicts in gene identification, researchers should implement the following two fundamental guidelines as standards for utilization of locus tags in genome analysis, annotation, submission, reporting, and publication. (i) Locus tag prefixes are systematic gene identifiers for all of the replicons of a genome and as such should be associated with a single genome project submission. (ii) New genome projects must be registered with INSD, and new locus tag prefixes must be assigned in cooperation with INSD to ensure that they conform to the agreed-upon criteria. Locus tag prefixes that are currently in use may be

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Coordinates for new structures of macromolecules must be deposited in the Protein Data Bank and assigned identification codes must be included in the manuscript no later than the publication (online posting) date of the accepted manuscript. It is expected that the coordinates will be released to the public no later than the publication date of the article. Authors are encouraged to send coordinates with their original submission, however, so that reviewers can examine them along with the manuscript. The accession number(s) should be listed in a separate paragraph at the end of the Materials and Methods section.

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The entire set of supporting microarray data must be deposited in the appropriate public database (e.g., GEO, ArrayExpress, or CIBEX) and the assigned accession number(s) must be included in the manuscript no later than the modification stage of the review process. It is expected that the data will be released to the public no later than the publication (online posting) date of the accepted manuscript. Authors are encouraged to send the relevant data with their original submission, however, so that reviewers can examine them along with the manuscript. The accession number(s) should be listed in a separate paragraph at the end of the Materials and Methods section.

The URLs of the databases mentioned above are as follows: Gene Expression Omnibus (GEO), <http://www.ncbi.nlm.nih.gov/projects/geo/>; ArrayExpress, <http://www.ebi.ac.uk/microarray-as/ae/>; and Center for Information Biology Gene Expression Database (CIBEX), <http://cibex.nig.ac.jp/index.jsp>.

Culture Deposition

JB expects authors to deposit important strains in publicly accessible culture collections and to refer to the collections and strain numbers in the text. Since the authenticity of subcultures of culture collection specimens that are distributed by individuals cannot be ensured, authors should indicate laboratory strain designations and donor sources as well as original culture collection identification numbers.

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Supplemental material intended for posting by ASM should be restricted primarily to large or complex data sets or results that cannot readily be displayed in printed form because of space or technical limitations. Such material

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SUBMISSION, REVIEW, AND PUBLICATION PROCESSES

Submission Process

All submissions to JB must be made electronically. In 2011, the ASM journals are switching from Rapid Review to the eJournalPress (eJP) manuscript submission and peer review system. Journals will be transitioned one by one over the course of several months, and the exact timing for JB has not been determined. When the transition occurs, only new manuscript submissions will be made through the eJP system. If you are returning a modified manuscript and made the original submission in Rapid Review, please use Rapid Review. For up-to-date information about where to submit your manuscript, please refer to the separate HTML version of Instructions to Authors, <http://jb.asm.org/misc/ifora.dtl>, which is updated throughout the year.

Review Process

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To expedite the review process, authors should recommend at least three reviewers who have expertise in the field, who are not members of their institution(s), who have not recently been associated with their laboratory(ies), and who could not otherwise be considered to pose a conflict of interest regarding the submitted manuscript. Please provide their contact information where indicated on the submission form.

Copies of in-press and submitted manuscripts that are important for judgment of the present manuscript should be included as supplemental material to facilitate the review.

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of the ASM Journals Department completes the editing of the manuscript to bring it into conformity with prescribed standards.

JB Accepts

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1. **Alexander, T. W., et al.** 2008. Effect of subtherapeutic administration of antibiotics on the prevalence of antibiotic-resistant *Escherichia coli* bacteria in feedlot cattle. *Appl. Environ. Microbiol.* **74**:4405–4416.
2. **Cox, C. S., B. R. Brown, and J. C. Smith.** *J. Gen. Genet.*, in press.* {Article title is optional; journal title is mandatory.}
3. **da Costa, M. S., M. F. Nobre, and F. A. Rainey.** 2001. Genus I. *Thermus* Brock and Freeze 1969, 295,^{AL} emend. Nobre, Trüper and da Costa 1996b, 605, p. 404–414. In D. R. Boone, R. W. Castenholz, and G. M. Garrity (ed.), *Bergey's manual of systematic bacteriology*, 2nd ed., vol. 1. Springer, New York, NY.
4. **Elder, B. L., and S. E. Sharp.** 2003. Cumitech 39, Competency assessment in the clinical laboratory. Coordinating ed., S. E. Sharp. ASM Press, Washington, DC.
5. **Falagas, M. E., and S. K. Kasiakou.** 2006. Use of international units when dosing colistin will help decrease confusion related to various formulations of the drug around the world. *Antimicrob. Agents Chemother.* **50**:2274–2275. (Letter.) {"Letter" or "Letter to the editor" is allowed but not required at the end of such an entry.}
6. **Fitzgerald, G., and D. Shaw.** In A. E. Waters (ed.), *Clinical microbiology*, in press. EFH Publishing Co., Boston, MA.* {Chapter title is optional.}
7. **Forman, M. S., and A. Valsamakis.** 2003. Specimen collection, transport, and processing: virology, p. 1227–1241. In P. R. Murray, E. J. Baron, M. A. Pfaller, J. H. Tenover, and R. H. Tenover (ed.), *Manual of clinical microbiology*, 8th ed. ASM Press, Washington, DC.
8. **Garcia, C. O., et al.** 1996. Detection of salmonella DNA in synovial membrane and synovial fluid from Latin American patients. *Arthritis Rheum.* **39**(Suppl.):S185. {Meeting abstract published in journal supplement.}
9. **Green, P. N., D. Hood, and C. S. Dow.** 1984. Taxonomic status of some methylotrophic bacteria, p. 251–254. In R. L. Crawford and R. S. Hanson (ed.), *Microbial growth on C₁ compounds*. Proceedings of the 4th International Symposium. American Society for Microbiology, Washington, DC.
10. **Odell, J. C.** April 1970. Process for batch culturing. U.S. patent 484,363,770. {Include the name of the patented item/process if possible; the patent number is mandatory.}
11. **O'Malley, D. R.** 1998. Ph.D. thesis. University of California, Los Angeles, CA. {Title is optional.}
12. **Rotimi, V. O., N. O. Salako, E. M. Mohaddas, and L. P. Philip.** 2005. Abstr. 45th Intersci. Conf. Antimicrob. Agents Chemother., abstr. D-1658. {Abstract title is optional.}
13. **Smith, D., C. Johnson, M. Maier, and J. J. Maurer.** 2005. Distribution of fimbrial, phage and plasmid associated virulence genes among poultry *Salmonella enterica* serovars, abstr. P-038, p. 445. Abstr. 105th Gen. Meet. Am. Soc. Microbiol. American Society for Microbiology, Washington, DC. {Abstract title is optional.}
14. **Stratagene.** 2006. Yeast DNA isolation system: instruction manual. Stratagene, La Jolla, CA. {Use the company name as the author if none is provided for a company publication.}

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2. **Dionne, M. S., and D. S. Schneider.** 2002. Screening the fruitfly immune system. *Genome Biol.* **3**:REVIEWS1010. <http://genomebiology.com/2002/3/4/reviews/1010>.
3. **Smith, F. X., H. J. Merianos, A. T. Brunger, and D. M. Engelman.** 2001. Polar residues drive association of polyleucine transmembrane helices. *Proc. Natl. Acad. Sci. U. S. A.* **98**:2250–2255. doi:10.1073/pnas.041593698.
4. **Winnick, S., D. O. Lucas, A. L. Hartman, and D. Toll.** 2005. How do you improve compliance? *Pediatrics* **115**:e718–e724.

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- ... similar results (R. B. Layton and C. C. Weathers, unpublished data).
- ... system was used (J. L. McInerney, A. F. Holden, and P. N. Brighton, submitted for publication).
- ... as described previously (M. G. Gordon and F. L.

Rattner, presented at the Fourth Symposium on Food Microbiology, Overton, IL, 13 to 15 June 1989). {*For nonpublished abstracts and posters, etc.*}
 ... this new process (V. R. Smoll, 20 June 1999, Australian Patent Office). {*For non-U.S. patent applications, give the date of publication of the application.*}
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Compression. When figure files are uploaded to the manuscript submission and review system, they may be compressed with WinZip.

Color illustrations. Color costs must be borne by the author. See "[Publication Fees](#)." **All figures submitted in color will be processed as color.** Adherence to the following guidelines will help to minimize costs and to ensure color reproduction that is as accurate as possible.

The online version is considered the version of record for JB and all other ASM journals. To maximize online reproduction, color illustrations should be supplied in the RGB color mode, as either (i) RGB TIFF images with a resolution of at least 300 pixels per inch (raster files, consisting of pixels) or (ii) Illustrator-compatible EPS files with RGB color elements (vector files, consisting of lines, fonts, fills, and images). CMYK files are also accepted. Other than in color space, CMYK files must meet the same production criteria as RGB files. The RGB color space is the native color space of computer monitors and of most of the equipment and software used to capture scientific data, and it can display a wider range of colors (especially bright fluorescent hues) than the CMYK (cyan, magenta, yellow, black) color space used by print devices that put ink (or toner) on paper. For the print version (and reprints), ASM's print provider will automatically create CMYK versions of color illustrations from the supplied RGB versions. Color in the print journal may not match that in the online journal of record because of the smaller range of colors capable of being reproduced by CMYK inks on a printing press. For additional information on RGB versus CMYK color, refer to the Cadmus digital art site, http://art.cadmus.com/da/guidelines_rgb.jsp.

Drawings

Submit graphs, charts, complicated chemical or mathematical formulas, diagrams, and other drawings as finished products not requiring additional artwork or typesetting. All elements, including letters, numbers, and symbols, must be easily readable, and both axes of a graph must be labeled. Keep in mind that the journal is published both in print and online and that the same electronic files submitted by the authors are used to produce both formats.

When creating line art, please use the following guidelines:

(i) **All art must be submitted at its intended publication size.** For acceptable dimensions, see “[Size](#),” above.

(ii) **Avoid using screens (i.e., shading) in line art.** It can be difficult and time-consuming to reproduce these images without moiré patterns. Various pattern backgrounds are preferable to screens as long as the patterns are not imported from another application. If you must use images containing screens,

(a) Generate the image at line screens of 85 lines per inch or less.

(b) When applying multiple shades of gray, differentiate the gray levels by at least 20%.

(c) Never use levels of gray below 5% or above 95% as they are likely to fade out or become totally black when output.

(iii) Use thick, solid lines that are no finer than 1 point in thickness.

(iv) No type should be smaller than 6 points at the final publication size.

(v) Avoid layering type directly over shaded or textured areas.

(vi) Avoid the use of reversed type (white lettering on a black background).

(vii) Avoid heavy letters, which tend to close up, and unusual symbols, which the printer may not be able to reproduce in the legend.

(viii) If colors are used, avoid using similar shades of the same color and avoid very light colors.

In figure ordinate and abscissa scales (as well as table column headings), avoid the ambiguous use of numbers with exponents. Usually, it is preferable to use the appropriate Système International d’Unités (SI) symbols (μ for 10^{-6} , m for 10^{-3} , k for 10^3 , and M for 10^6 , etc.). A complete listing of SI symbols can be found in the International Union of Pure and Applied Chemistry (IUPAC) publication *Quantities, Units and Symbols in Physical Chemistry* (RSC Publishing, Cambridge, United Kingdom, 2007); an abbreviated list is available at <http://old.iupac.org/reports/1993/homann/index.html>. Thus, representation of 20,000 cpm on a figure ordinate should be made by the number 20 accompanied by the label kcpm.

When powers of 10 must be used, the journal requires that the exponent power be associated with the number shown. In representing 20,000 cells per ml, the numeral

on the ordinate should be “2” and the label should be “ 10^4 cells per ml” (not “cells per ml $\times 10^{-4}$ ”). Likewise, an enzyme activity of 0.06 U/ml might be shown as 6 accompanied by the label 10^{-2} U/ml. The preferred designation is 60 mU/ml (milliunits per milliliter).

Presentation of Nucleic Acid Sequences

Long nucleic acid sequences must be presented as figures in the following format to conserve space. Print the sequence in lines of approximately 100 to 120 nucleotides in a nonproportional (monospace) font that is easily legible when published with a line length of 6 inches (ca. 15.2 cm). If possible, lines of nucleic acid sequence should be further subdivided into blocks of 10 or 20 nucleotides by spaces within the sequence or by marks above it. Uppercase and lowercase letters may be used to designate the exon-intron structure or transcribed regions, etc., if the lowercase letters remain legible at a 6-inch (ca. 15.2-cm) line length. Number the sequence line by line; place numerals representing the first base of each line to the left of the lines. Minimize spacing between lines of sequence, leaving room only for annotation of the sequence. Annotation may include boldface, underlining, brackets, and boxes, etc. Encoded amino acid sequences may be presented, if necessary, immediately above or below the first nucleotide of each codon, by using the single-letter amino acid symbols. Comparisons of multiple nucleic acid sequences should conform as nearly as possible to the same format.

Figure Legends

On initial submission, to assist review, the legend should be incorporated in the image file and appear beneath the figure. At the modification stage, figure legends must be provided as text files separate from the image file.

Legends should provide enough information so that the figure is understandable without frequent reference to the text. However, detailed experimental methods must be described in the Materials and Methods section, not in a figure legend. A method that is unique to one of several experiments may be reported in a legend only if the discussion is very brief (one or two sentences). Define all symbols used in the figure and define all abbreviations that are not used in the text.

Tables

Tables that contain artwork, chemical structures, or shading must be submitted as illustrations in an acceptable format at the modification stage. The preferred format for regular tables is Microsoft Word; however, WordPerfect and Acrobat PDF are also acceptable. Note that a straight Excel file is not currently an acceptable format. Excel files must be either embedded in a Word or WordPerfect document or converted to PDF before being uploaded. **If your modified manuscript contains PDF tables and is being submitted in Rapid**

TABLE 1. Induction of creatinine deiminase in *Clostridium* sp. strains XP32 and XP56

N source ^a	<i>Clostridium</i> sp. strain XP32		<i>Clostridium</i> sp. strain XP56	
	Total enzyme ^b	Sp act (U/mg of protein)	Total enzyme	Sp act (U/mg of protein)
Ammonia	0.58	0.32	0.50	0.28
Glutamic acid	5.36	1.48	2.18	0.61
Aspartic acid	2.72	0.15	1.47	0.06
Arginine	3.58	2.18	3.38	2.19
Creatinine	97.30	58.40	104.00	58.30

^a The inoculum was grown in glucose broth with ammonium sulfate, washed twice, and then transferred into the media with the N sources listed above.

^b Enzyme units in cell extract obtained from ca. 10¹⁰ cells.

Review, select “for reviewing purposes only” at the beginning of the file upload process.

Tables should be formatted as follows. Arrange the data so that **columns of like material read down, not across**. The headings should be sufficiently clear so that the meaning of the data is understandable without reference to the text. See the “[Abbreviations](#)” section of these Instructions for those that should be used in tables. Explanatory footnotes are acceptable, but more-extensive table “legends” are not. Footnotes should not include detailed descriptions of the experiment. Tables must include enough information to warrant table format; those with fewer than six pieces of data will be incorporated into the text by the copy editor. Table 1 is an example of a well-constructed table.

Cover Photographs and Drawings

JB publishes photographs and drawings on the front cover. Since we still want to optimize print presentation for covers even though the online journal is the journal of record (see above), color cover art must be prepared in the CMYK color space. Invitations are issued to authors whose manuscripts are returned for modification or whose manuscripts have been accepted for publication in JB; material should be related to the work presented in the manuscript. Unsolicited photos will also be considered. No material submitted for consideration will be returned to the author. Authors will be notified if their cover art is selected. Copyright for the chosen material must be transferred to ASM. A short description of the cover image will be included at the end of the table of contents or the author index. Technical specifications are available from the cover editor, Roberto Kolter (rkolter@hms.harvard.edu).

NOMENCLATURE

Chemical and Biochemical Nomenclature

The recognized authority for the names of chemical compounds is *Chemical Abstracts* (CAS; <http://www.cas.org/>) and its indexes. *The Merck Index*, 14th ed. (Merck & Co., Inc., Whitehouse Station, NJ, 2006), is also an

excellent source. For guidelines to the use of biochemical terminology, consult *Biochemical Nomenclature and Related Documents* (Portland Press, London, United Kingdom, 1992), available at <http://www.chem.qmul.ac.uk/iupac/bibliog/white.html>, and the instructions to authors of the *Journal of Biological Chemistry* and the *Archives of Biochemistry and Biophysics* (first issues of each year).

Do not express molecular weight in daltons; molecular weight is a unitless ratio. Molecular mass is expressed in daltons.

For enzymes, use the recommended (trivial) name assigned by the Nomenclature Committee of the International Union of Biochemistry (IUB) as described in *Enzyme Nomenclature* (Academic Press, Inc., New York, NY, 1992) and at <http://www.chem.qmul.ac.uk/iubmb/enzyme/>. If a nonrecommended name is used, place the proper (trivial) name in parentheses at first use in the abstract and text. Use the EC number when one has been assigned. Authors of papers describing enzymological studies should review the standards of the STREND Commission for information required for adequate description of experimental conditions and for reporting enzyme activity data (<http://www.beilstein-institut.de/en/projekte/strenda/guidelines/>).

Nomenclature of Microorganisms

Binary names, consisting of a generic name and a specific epithet (e.g., *Escherichia coli*), must be used for all microorganisms. Names of categories at or above the genus level may be used alone, but specific and subspecific epithets may not. A specific epithet must be preceded by a generic name, written out in full the first time it is used in a paper. Thereafter, the generic name should be abbreviated to the initial capital letter (e.g., *E. coli*), provided there can be no confusion with other genera used in the paper. Names of all taxa (kingdoms, phyla, classes, orders, families, genera, species, and subspecies) are printed in italics and should be italicized in the manuscript; strain designations and numbers are not. Vernacular (common) names should be in lowercase roman type (e.g., streptococcus, brucella). For *Salmonella*, genus, species, and subspecies names should be rendered in standard form: *Salmonella enterica* at first use, *S. enterica* thereafter; *Salmonella enterica* subsp. *arizonae* at first use, *S. enterica* subsp. *arizonae* thereafter. Names of serovars should be in roman type with the first letter capitalized: *Salmonella enterica* serovar Typhimurium. After the first use, the serovar may also be given without a species name: *Salmonella* Typhimurium, *S. Typhimurium*, or *Salmonella* serovar Typhimurium. For other information regarding serovar designations, see *Antigenic Formulae of the Salmonella Serovars*, 9th ed. (P. A. D. Grimont and F.-X. Weill, WHO Collaborating Centre for Reference and Research on *Salmonella*, Institut Pasteur, Paris, France, 2007; see <http://www.pasteur.fr/ip/portal/action/WebdriveActionEvent/oid/01s-000036-089>). For a summary of the current standards for *Salmonella* nomenclature and the Kaufmann-White cri-

teria, see the article by Brenner et al. (J. Clin. Microbiol. **38**:2465–2467, 2000), the opinion of the Judicial Commission of the International Committee on Systematics of Prokaryotes (Int. J. Syst. Evol. Microbiol. **55**:519–520, 2005), and the article by Tindall et al. (Int. J. Syst. Evol. Microbiol. **55**:521–524, 2005).

The spelling of bacterial names should follow the *Approved Lists of Bacterial Names (Amended) & Index of the Bacterial and Yeast Nomenclatural Changes* (V. B. D. Skerman et al., ed., American Society for Microbiology, Washington, DC, 1989) and the validation lists and notification lists published in the *International Journal of Systematic and Evolutionary Microbiology* (formerly the *International Journal of Systematic Bacteriology*) since January 1989. In addition, two sites on the World Wide Web list current approved bacterial names: Bacterial Nomenclature Up-to-Date (http://www.dsmz.de/microorganisms/main.php?contentleft_id=14) and List of Prokaryotic Names with Standing in Nomenclature (<http://www.bacterio.cict.fr/>). If there is reason to use a name that does not have standing in nomenclature, the name should be enclosed in quotation marks in the title and at its first use in the abstract and the text and an appropriate statement concerning the nomenclatural status of the name should be made in the text. “*Candidatus*” species should always be set in quotation marks.

Microorganisms, viruses, and plasmids should be given designations consisting of letters and serial numbers. It is generally advisable to include a worker's initials or a descriptive symbol of locale or laboratory, etc., in the designation. Each new strain, mutant, isolate, or derivative should be given a new (serial) designation. This designation should be distinct from those of the genotype and phenotype, and genotypic and phenotypic symbols should not be included. Plasmids are named with a lowercase “p” followed by the designation in uppercase letters and numbers. To avoid the use of the same designation as that of a widely used strain or plasmid, check the designation against a publication database such as Medline.

Genetic Nomenclature

To facilitate accurate communication, **it is important that standard genetic nomenclature be used whenever possible and that deviations or proposals for new naming systems be endorsed by an appropriate authoritative body.** Review and/or publication of submitted manuscripts that contain new or nonstandard nomenclature may be delayed by the editor or the Journals Department so that they may be reviewed by the Genetics and Genomics Committee of the ASM Publications Board.

Before submission of manuscripts, authors may direct questions on genetic nomenclature to the committee's chairperson: Maria Costanzo (maria@genome.stanford.edu). Such a consultation should be mentioned in the manuscript submission letter.

Bacteria. The genetic properties of bacteria are described in terms of phenotypes and genotypes. The phenotype describes the observable properties of an organ-

ism. The genotype refers to the genetic constitution of an organism, usually in reference to some standard wild type. The guidelines that follow are based on the recommendations of Demerec et al. (Genetics **54**:61–76, 1966).

(i) Phenotypic designations must be used when mutant loci have not been identified or mapped. They can also be used to identify the protein product of a gene, e.g., the OmpA protein. Phenotypic designations generally consist of three-letter symbols; these are not italicized, and the first letter of the symbol is capitalized. It is preferable to use Roman or Arabic numerals (instead of letters) to identify a series of related phenotypes. Thus, nucleic acid polymerase mutants might be designated Pol1, Pol2, and Pol3, etc. Wild-type characteristics can be designated with a superscript plus (Pol⁺), and, when necessary for clarity, negative superscripts (Pol[−]) can be used to designate mutant characteristics. Lowercase superscript letters may be used to further delineate phenotypes (e.g., Str^r for streptomycin resistance). Phenotypic designations should be defined.

(ii) Genotypic designations are also indicated by three-letter locus symbols. In contrast to phenotypic designations, these are lowercase italic (e.g., *ara his rps*). If several loci govern related functions, these are distinguished by italicized capital letters following the locus symbol (e.g., *araA araB araC*). Promoter, terminator, and operator sites should be indicated as described by Bachmann and Low (Microbiol. Rev. **44**:1–56, 1980), e.g., *lacZp*, *lacAt*, and *lacZo*.

(iii) Wild-type alleles are indicated with a superscript plus (*ara⁺ his⁺*). A superscript minus is not used to indicate a mutant locus; thus, one refers to an *ara* mutant rather than an *ara[−]* strain.

(iv) Mutation sites are designated by placing serial isolation numbers (allele numbers) after the locus symbol (e.g., *araA1 araA2*). If only a single such locus exists or if it is not known in which of several related loci the mutation has occurred, a hyphen is used instead of the capital letter (e.g., *ara-23*). It is essential in papers reporting the isolation of new mutants that allele numbers be given to the mutations. For *Escherichia coli*, there is a registry of such numbers: the Coli Genetic Stock Center (<http://cgsc.biology.yale.edu/>). For the genus *Salmonella*, the registry is the *Salmonella* Genetic Stock Centre (<http://people.ucalgary.ca/~kesander/>). For the genus *Bacillus*, the registry is the *Bacillus* Genetic Stock Center (<http://www.bgsc.org/>).

(v) The use of superscripts with genotypes (other than + to indicate wild-type alleles) should be avoided. Designations indicating amber mutations (Am), temperature-sensitive mutations (Ts), constitutive mutations (Con), cold-sensitive mutations (Cs), production of a hybrid protein (Hyb), and other important phenotypic properties should follow the allele number [e.g., *araA230*(Am) *hisD21*(Ts)]. All other such designations of phenotype must be defined at the first occurrence. If superscripts must be used, they must be approved by the editor and defined at the first occurrence in the text.

Subscripts may be used in two situations. Subscripts

may be used to distinguish between genes (having the same name) from different organisms or strains; e.g., *his*_{*E. coli*} or *his*_{K-12} for the *his* gene of *E. coli* or strain K-12, respectively, may be used to distinguish this gene from the *his* gene in another species or strain. An abbreviation may also be used if it is explained. Similarly, a subscript is also used to distinguish between genetic elements that have the same name. For example, the promoters of the *gln* operon can be designated *glnAp*₁ and *glnAp*₂. This form departs slightly from that recommended by Bachmann and Low (e.g., *desC1p*).

(vi) Deletions are indicated by the symbol Δ placed before the deleted gene or region, e.g., Δ *trpA*432, Δ (*aroP-aceE*)419, or Δ (*hisQ-hisJ*)1256. Similarly, other symbols can be used (with appropriate definition). Thus, a fusion of the *ara* and *lac* operons can be shown as Φ (*ara-lac*)95. Likewise, Φ (*araB'-lacZ*⁺)96 indicates that the fusion results in a truncated *araB* gene fused to an intact *lacZ* gene, and Φ (*malE-lacZ*)97(Hyb) shows that a hybrid protein is synthesized. An inversion is shown as IN(*rrnD-rrnE*)1. An insertion of an *E. coli his* gene into plasmid pSC101 at zero kilobases (0 kb) is shown as pSC101 Ω (0kb::K-12*hisB*)4. An alternative designation of an insertion can be used in simple cases, e.g., *galT*236::Tn5. The number 236 refers to the locus of the insertion, and if the strain carries an additional *gal* mutation, it is listed separately. Additional examples, which utilize a slightly different format, can be found in the papers by Campbell et al. and Novick et al. cited below. It is important in reporting the construction of strains in which a mobile element was inserted and subsequently deleted that this fact be noted in the strain table. This can be done by listing the genotype of the strain used as an intermediate in a table footnote or by making a direct or parenthetical remark in the genotype, e.g., (F⁻), Δ Mu cts, or *mal*:: Δ Mu cts::*lac*. In setting parenthetical remarks within the genotype or dividing the genotype into constituent elements, parentheses and brackets are used without special meaning; brackets are used outside parentheses. To indicate the presence of an episome, parentheses (or brackets) are used (λ , F⁺). Reference to an integrated episome is indicated as described for inserted elements, and an exogenote is shown as, for example, W3110/F'8(*gal*⁺).

For information about the symbols in current use, consult Berlyn (Microbiol. Mol. Biol. Rev. **62**:814–984, 1998) for *E. coli* K-12, Sanderson and Roth (Microbiol. Rev. **52**:485–532, 1988) for *Salmonella* serovar Typhimurium, Holloway et al. (Microbiol. Rev. **43**:73–102, 1979) for the genus *Pseudomonas*, and Piggot and Hoch (Microbiol. Rev. **49**:158–179, 1985) for *Bacillus subtilis*.

Conventions for naming genes. It is recommended that (entirely) new genes be given names that are mnemonics of their function, avoiding names that are already assigned and earlier or alternative gene names, irrespective of the bacterium for which such assignments have been made. Similarly, it is recommended that, whenever possible, orthologous genes present in differ-

ent organisms receive the same name. When homology is not apparent or the function of a new gene has not been established, a provisional name may be given by one of the following methods. (i) The gene may be named on the basis of its map location in the style *yaaA*, analogous to the style used for recording transposon insertions (*zef*) as discussed below. A list of such names in use for *E. coli* has been published by Rudd (Microbiol. Mol. Biol. Rev. **62**:985–1019, 1998). (ii) A provisional name may be given in the style described by Demerec et al. (e.g., *usg*, gene upstream of *folC*). Such names should be unique, and names such as *orf* or *genX* should not be used. For reference, the Coli Genetic Stock Center's database includes an updated listing of *E. coli* gene names and gene products. It is accessible on the Internet (<http://cgsc.biology.yale.edu/index.php>). A list can also be found in the work of Riley (Microbiol. Rev. **57**:862–952, 1993). For the genes of other bacteria, consult the references given above.

For prokaryotes, gene names should not begin with prefixes indicating the genus and species from which the gene is derived (for example, do not use *EcmeCA* for the *mecA* gene from *E. coli*). However, subscripts may be used where necessary to distinguish between genes from different organisms or strains as described in section v of “Bacteria” above.

Locus tags. Locus tags are systematic, unique identifiers that are assigned to each gene in GenBank. All genes mentioned in a manuscript should be traceable to their sequences by the reader, and locus tags may be used for this purpose in manuscripts to identify uncharacterized genes. In addition, authors should check GenBank to make sure that they are using the correct, up-to-date format for locus tags (e.g., uppercase versus lowercase letters and the presence or absence of an underscore, etc.). Locus tag formats vary between different organisms and also may be updated for a given organism, so it is important to check GenBank at the time of manuscript preparation.

“Mutant” versus “mutation.” Keep in mind the distinction between a mutation (an alteration of the primary sequence of the genetic material) and a mutant (a strain carrying one or more mutations). One may speak about the mapping of a mutation, but one cannot map a mutant. Likewise, a mutant has no genetic locus, only a phenotype.

“Homology” versus “similarity.” For use of terms that describe relationships between genes, consult the articles by Theissen (Nature **415**:741, 2002) and Fitch (Trends Genet. **16**:227–231, 2000). “Homology” implies a relationship between genes that have a common evolutionary origin; partial homology is not recognized. When sequence comparisons are discussed, it is more appropriate to use the term “percent sequence similarity” or “percent sequence identity,” as appropriate.

Strain designations. Do not use the genotype as a name (e.g., “subsequent use of *leuC6* for transduction”). If a strain designation has not been chosen, select an appropriate word combination (e.g., “another strain containing the *leuC6* mutation”).

Bacteriophages. The genetic nomenclature for phages differs from that for bacteria and tends to have separate conventions for each phage. Genetic symbols may be one, two, or three letters and are italicized. For example, a mutant strain of λ might be designated λ *Aam11 int2 red114 cI857*; this strain carries mutations in genes *cI*, *int*, and *red* and an amber-suppressible (*am*) mutation in gene *A*. Phenotypic symbols and designations of gene products are not italicized (e.g., “the *Spi* phenotype” or “*Int* protein”), and superscript plus and minus symbols can be used to indicate wild-type and mutant phenotypes, respectively. Host DNA insertions into phages should be delineated by square brackets, and the genetic symbols and designations for such inserted DNA should conform to those used for the host genome. Lists of gene symbols for several phages can be found in *Genetic Maps*, 6th ed. (S. J. O’Brien, ed., Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 1993). Relevant references for some of the more widely studied phages are as follows: for phage λ , Daniels et al. (p. 469–515, in R. W. Hendrix, J. W. Roberts, F. W. Stahl, and R. A. Weisberg, ed., *Lambda II*, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, 1983); for phage T4, Kutter et al. (p. 491–519, in J. D. Karam, ed., *Molecular Biology of Bacteriophage T4*, American Society for Microbiology, Washington, DC, 1994); and for phage T7, Dunn and Studier (J. Mol. Biol. **166**:477–535, 1983).

Transposable elements, plasmids, and restriction enzymes. Nomenclature of transposable elements (insertion sequences, transposons, and phage Mu, etc.) should follow the recommendations of Campbell et al. (Gene **5**:197–206, 1979), with the modifications given in section vi of “Bacteria,” above. The Internet site where insertion sequences of eubacteria and archaea are described and new sequences can be recorded is <http://www-is.biotoul.fr/is.html>.

The system of designating transposon insertions at sites where there are no known loci, e.g., *zef-123::Tn5*, has been described by Chumley et al. (Genetics **91**:639–655, 1979). The nomenclature recommendations of Novick et al. (Bacteriol. Rev. **40**:168–189, 1976) for plasmids and plasmid-specified activities, of Low (Bacteriol. Rev. **36**:587–607, 1972) for F’ factors, and of Roberts et al. (Nucleic Acids Res. **31**:1805–1812, 2003) for restriction enzymes, DNA methyltransferases, homing endonucleases, and their genes should be used. The nomenclature for recombinant DNA molecules constructed *in vitro* follows the nomenclature for insertions in general. DNA inserted into recombinant DNA molecules should be described by using the gene symbols and conventions for the organism from which the DNA was obtained.

Tetracycline resistance determinants. The nomenclature for tetracycline resistance determinants is based on the proposal of Levy et al. (Antimicrob. Agents Chemother. **43**:1523–1524, 1999). The style for such determinants is, e.g., Tet B; the space helps distinguish the determinant designation from that for phenotypes and proteins (TetB). The above-referenced article also gives the correct format for genes, proteins, and determinants in this family.

ABBREVIATIONS AND CONVENTIONS

Verb Tense

ASM strongly recommends that for clarity you use the **past** tense to narrate particular events in the past, including the procedures, observations, and data of the study that you are reporting. Use the present tense for your own general conclusions, the conclusions of previous researchers, and generally accepted facts. Thus, most of the abstract, Materials and Methods, and Results will be in the past tense, and most of the introduction and some of the Discussion will be in the present tense.

Be aware that it may be necessary to vary the tense in a single sentence. For example, it is correct to say “White (30) demonstrated that XYZ cells *grow* at pH 6.8,” “Figure 2 shows that ABC cells failed to grow at room temperature,” and “Air *was* removed from the chamber and the mice *died*, which *proves* that mice *require* air.” In reporting statistics and calculations, it is correct to say “The values for the ABC cells *are* statistically significant, indicating that the drug inhibited. . . .”

For an in-depth discussion of tense in scientific writing, see p. 191–193 in *How To Write and Publish a Scientific Paper*, 6th ed.

Abbreviations

General. Abbreviations should be used as an aid to the reader, rather than as a convenience to the author, and therefore their **use should be limited**. Abbreviations other than those recommended by the IUPAC-IUB (*Biochemical Nomenclature and Related Documents*, 1992) should be used only when a case can be made for necessity, such as in tables and figures.

It is often possible to use pronouns or to paraphrase a long word after its first use (e.g., “the drug” or “the substrate”). Standard chemical symbols and trivial names or their symbols (folate, Ala, and Leu, etc.) may also be used.

Define each abbreviation and introduce it in parentheses the first time it is used; e.g., “cultures were grown in Eagle minimal essential medium (MEM).” Generally, eliminate abbreviations that are not used at least three times in the text (including tables and figure legends).

Not requiring introduction. In addition to abbreviations for Système International d’Unités (SI) units of mea-

surement, other common units (e.g., bp, kb, and Da), and chemical symbols for the elements, the following should be used without definition in the title, abstract, text, figure legends, and tables: DNA (deoxyribonucleic acid); cDNA (complementary DNA); RNA (ribonucleic acid); cRNA (complementary RNA); RNase (ribonuclease); DNase (deoxyribonuclease); rRNA (ribosomal RNA); mRNA (messenger RNA); tRNA (transfer RNA); AMP, ADP, ATP, dAMP, ddATP, and GTP, etc. (for the respective 5' phosphates of adenosine and other nucleosides) (add 2'-, 3'-, or 5'- when needed for contrast); ATPase and dGTPase, etc. (adenosine triphosphatase and deoxyguanosine triphosphatase, etc.); NAD (nicotinamide adenine dinucleotide); NAD⁺ (nicotinamide adenine dinucleotide, oxidized); NADH (nicotinamide adenine dinucleotide, reduced); NADP (nicotinamide adenine dinucleotide phosphate); NADPH (nicotinamide adenine dinucleotide phosphate, reduced); NADP⁺ (nicotinamide adenine dinucleotide phosphate, oxidized); poly(A) and poly(dT), etc. (polyadenylic acid and polydeoxythymidylic acid, etc.); oligo(dT), etc. (oligodeoxythymidylic acid, etc.); UV (ultraviolet); PFU (plaque-forming units); CFU (colony-forming units); MIC (minimal inhibitory concentration); Tris [tris(hydroxymethyl)aminomethane]; DEAE (diethylaminoethyl); EDTA (ethylenediaminetetraacetic acid); EGTA [ethylene glycol-bis(β-aminoethyl ether)-N,N,N',N'-tetraacetic acid]; HEPES (N-2-hydroxyethylpiperazine-N'-2-ethanesulfonic acid); PCR (polymerase chain reaction); and AIDS (acquired immunodeficiency syndrome). Abbreviations for cell lines (e.g., HeLa) also need not be defined.

The following abbreviations should be used without definition in tables:

amt (amount)	SE (standard error)
approx (approximately)	SEM (standard error of the mean)
avg (average)	
concn (concentration)	sp act (specific activity)
diam (diameter)	sp gr (specific gravity)
expt (experiment)	temp (temperature)
exptl (experimental)	tr (trace)
ht (height)	vol (volume)
mo (month)	vs (versus)
mol wt (molecular weight)	wk (week)
no. (number)	wt (weight)
prepn (preparation)	yr (year)
SD (standard deviation)	

Reporting Numerical Data

Standard metric units are used for reporting length, weight, and volume. For these units and for molarity, use

the prefixes m, μ, n, and p for 10⁻³, 10⁻⁶, 10⁻⁹, and 10⁻¹², respectively. Likewise, use the prefix k for 10³. Avoid compound prefixes such as mμ or μμ. Use μg/ml or μg/g in place of the ambiguous ppm. Units of temperature are presented as follows: 37°C or 324 K.

When fractions are used to express units such as enzymatic activities, it is preferable to use whole units, such as “g” or “min,” in the denominator instead of fractional or multiple units, such as μg or 10 min. For example, “pmol/min” is preferable to “nmol/10 min,” and “μmol/g” is preferable to “nmol/μg.” It is also preferable that an unambiguous form such as exponential notation be used; for example, “μmol g⁻¹ min⁻¹” is preferable to “μmol/g/min.” Always report numerical data in the appropriate SI units.

For a review of some common errors associated with statistical analyses and reports, plus guidelines on how to avoid them, see the article by Olsen (*Infect. Immun.* **71**:6689–6692, 2003).

For a review of basic statistical considerations for virology experiments, see the article by Richardson and Overbaugh (*J. Virol.* **79**:669–676, 2005).

Isotopically Labeled Compounds

For simple molecules, isotopic labeling is indicated in the chemical formula (e.g., ¹⁴CO₂, ³H₂O, and H₂³⁵SO₄). Brackets are not used when the isotopic symbol is attached to the name of a compound that in its natural state does not contain the element (e.g., ³²S-ATP) or to a word that is not a specific chemical name (e.g., ¹³¹I-labeled protein, ¹⁴C-amino acids, and ³H-ligands).

For specific chemicals, the symbol for the isotope introduced is placed in square brackets directly preceding the part of the name that describes the labeled entity. Note that configuration symbols and modifiers precede the isotopic symbol. The following examples illustrate correct usage:

[¹⁴ C]urea	UDP-[U- ¹⁴ C]glucose
L-[methyl- ¹⁴ C]methionine	<i>E. coli</i> [³² P]DNA
[2,3- ³ H]serine	fructose 1,6-[1- ³² P]biphosphate
[α- ¹⁴ C]lysine	
[γ- ³² P]ATP	

JB follows the same conventions for isotopic labeling as the *Journal of Biological Chemistry*, and more-detailed information can be found in the instructions to authors of that journal (first issue of each year).